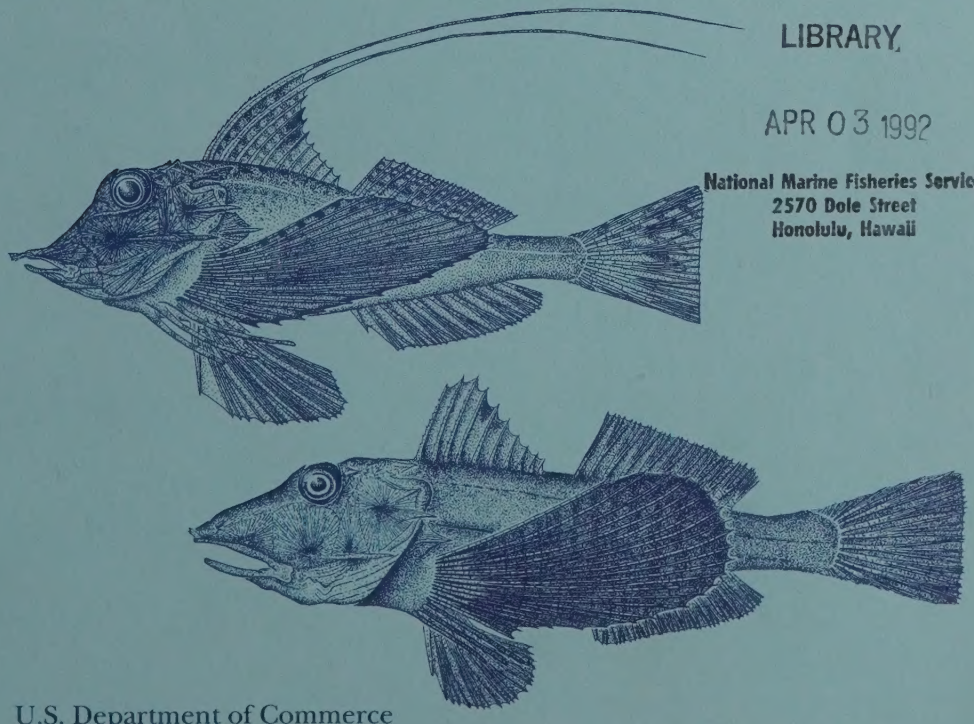
NOAA Technical Report NMFS 107

March 1992

Field Guide to the Searobins (*Prionotus* and *Bellator*) in the Western North Atlantic

Mike Russell
Mark Grace
Elmer J. Gutherz



LIBRARY
APR 03 1992
National Marine Fisheries Service
2570 Dole Street
Honolulu, Hawaii

U.S. Department of Commerce

Library
NOAA, National Marine Fisheries Service
SWFC Honolulu Laboratory F/SWC2
2570 Dole Street
Honolulu, HI 96822-2396

NOAA Technical Report NMFS

The major responsibilities of the National Marine Fisheries Service (NMFS) are to monitor and assess the abundance and geographic distribution of fishery resources, to understand and predict fluctuations in the quantity and distribution of these resources, and to establish levels for their optimum use. NMFS is also charged with the development and implementation of policies for managing national fishing grounds, with the development and enforcement of domestic fisheries regulations, with the surveillance of foreign fishing off U.S. coastal waters, and with the development and enforcement of international fishery agreements and policies. NMFS also assists the fishing industry through marketing service and economic analysis programs and through mortgage insurance and vessel construction subsidies. It collects, analyzes, and publishes statistics on various phases of the industry.

The NOAA Technical Report NMFS series was established in 1983 to replace two subcategories of the Technical Report series: "Special Scientific Report—Fisheries" and "Circular." The series contains the following types of reports: scientific investigations that document long-term continuing programs of NMFS; intensive scientific reports on studies of restricted scope; papers on applied fishery problems; technical reports of general interest intended to aid conservation and management; reports that review, in considerable detail and at high technical level, certain broad areas of research; and technical papers originating in economic studies and in management investigations. Since this is a formal series, all submitted papers, except those of the U.S.–Japan series on aquaculture, receive peer review and all papers, once accepted, receive professional editing before publication.

Copies of NOAA Technical Reports NMFS are available free in limited numbers to government agencies, both federal and state. They are also available in exchange for other scientific and technical publications in the marine sciences. Individual copies may be obtained for the U.S. Department of Commerce, National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. Although the contents of these reports have not been copyrighted and may be reprinted entirely, reference to source is appreciated.

Recently Published NOAA Technical Reports NMFS

90. **Elasmobrachs as living resources: advances in the biology, ecology, systematics, and the status of the fisheries,** edited by Harold L. Pratt Jr., Samuel H. Gruber, and Toru Taniuchi. July 1990, 518 p.

91. **Marine flora and fauna of the northeastern United States—Echinodermata: Crinoidea,** by Charles G. Messing and John H. Dearborn. August 1990, 30 p.

92. **Genetics in aquaculture: proceedings of the sixteenth U.S.–Japan meeting on aquaculture; Charleston, South Carolina, 20–21 October, 1987,** edited by Ralph S. Svrjcek. November 1990, 81 p.

93. **Distribution and abundance of juvenile salmonids off Oregon and Washington, 1981–1985,** by William G. Pearcy and Joseph P. Fisher. November 1990, 83 p.

94. **An economics guide to allocation of fish stocks between commercial and recreational fisheries,** by Steven F. Edwards. November 1990, 29 p.

95. **Larval fish recruitment and research in the Americas: proceedings of the thirteenth annual larval fish conference; Merida, Mexico, 21–26 May 1989,** edited by Robert D. Hoyt. January 1991, 147 p.

96. **Marine flora and fauna of the Eastern United States—Copepoda, Cyclopoida: Archinotodelphyidae, Notodelphyidae, and Ascidicolidae,** by Patricia L. Dudley and Paul L. Illg. January 1991, 40 p.

97. **Catalog of osteological collections of aquatic mammals from Mexico,** by Omar Vidal. January 1991, 36 p.

98. **Marine mammal strandings in the United States: proceedings of the second marine mammal stranding workshop; Miami, Florida, 3–5 December, 1987,** edited by John E. Reynolds III and Daniel K. Odell. January 1991, 157 p.

99. **Marine flora and fauna of the Northeastern United States: Erect Bryozoa,** by John S. Ryland and Peter J. Hayward. February 1991, 48 p.

100. **Marine flora and fauna of the Eastern United States: Dicyemida,** by Robert B. Short. February 1991, 16 p.

101. **Larvae of nearshore fishes in oceanic waters near Oahu, Hawaii,** by Thomas A. Clarke. March 1991, 19 p.

102. **Marine ranching: proceedings of the seventeenth U.S.–Japan meeting on aquaculture; Ise, Japan, 16–18 October 1988,** edited by Ralph S. Svrjcek. May 1991, 180 p.

103. **Benthic macrofauna of the New York Bight, 1979–89,** by Robert Reid, David J. Radosh, Ann B. Frame, Steven A. Fromm. December 1991, 50 p.

104. **Incidental catch of marine mammals by foreign and joint venture trawl vessels in the U.S. EEZ of the North Pacific, 1973–88,** by Michael A. Perez, and Thomas R. Loughlin. December 1991, 57 p.

NMFS Honolulu Library
00000000004805

NOAA Technical Report NMFS 107

Field Guide to the Searobins (*Prionotus* and *Bellator*) in the Western North Atlantic

Mike Russell
Mark Grace
Elmer J. Gutherz

Illustrations by Mark Grace

March 1992

U.S. DEPARTMENT OF COMMERCE
Robert Mosbacher, Secretary
National Oceanic and Atmospheric Administration
John A. Knauss, Under Secretary for Oceans and Atmosphere
National Marine Fisheries Service
William W. Fox Jr., Assistant Administrator for Fisheries

The National Marine Fisheries Service (NMFS) does not approve, recommend or endorse any proprietary product or proprietary material mentioned in this publication. No reference shall be made to NMFS, or to this publication furnished by NMFS, in any advertising or sales promotion which would indicate or imply that NMFS approves, recommends or endorses any proprietary product or proprietary material mentioned herein, or which has as its purpose an intent to cause directly or indirectly the advertised product to be used or purchased because of this NMFS publication.

Field Guide to the Searobins (*Prionotus* and *Bellator*) in the Western North Atlantic

MIKE RUSSELL, MARK GRACE, and ELMER J. GUTHERZ

National Marine Fisheries Service
Southeastern Fisheries Center
Pascagoula Laboratories
P.O. Drawer 1207
Pascagoula, Mississippi 39568-1207

ABSTRACT

Species identifications of *Prionotus* and *Bellator* are often difficult under field conditions owing to the large number of species and their overlapping taxonomic characteristics. This key is intended to provide a simplified, accurate means to identify adult searobins greater than 10 cm standard length. All recognized species from the western North Atlantic, the Gulf of Mexico, and Caribbean Sea are included.

Introduction

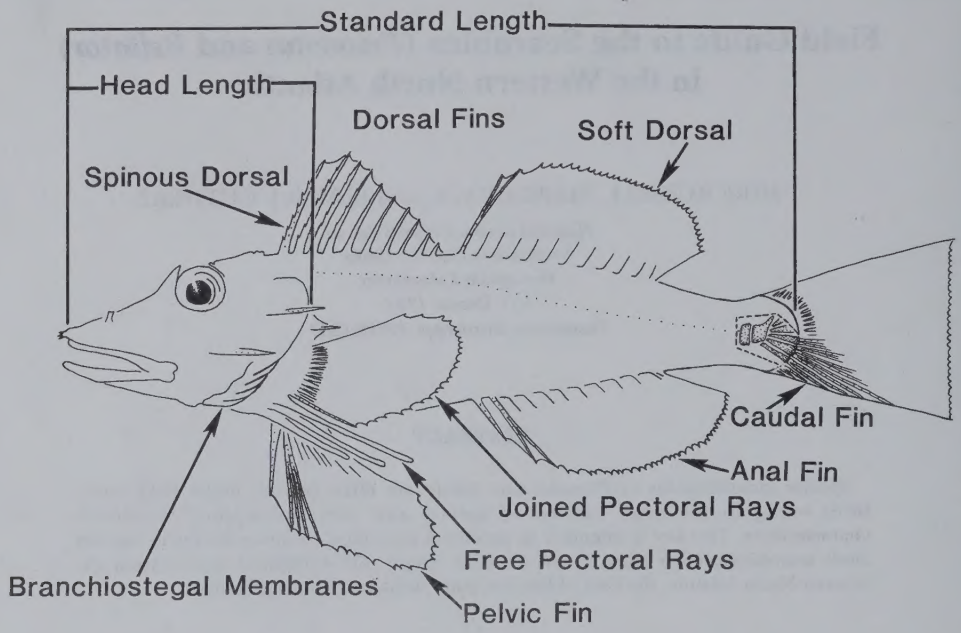
Within the family Triglidae in the western North Atlantic, Gulf of Mexico, and Caribbean Sea are 15 species of *Prionotus* and four of *Bellator.* A dichotomus key with illustrations of each species are provided for identification of adult specimens of these genera.

We have used names recognized by Miller and Richards (1991, a and b), Ginsburg (1950), Teague (1951); and the American Fisheries Society Committee's (1991) Special Publication No. 20—List of Common and Scientific Names (1991). Miller and Richards (1991a) was our primary source of scientific nomenclature; Ginsburg and Teague supplied taxonomic clarification. Common names, when available, were taken from the List of Common and Scientific Names with the exception of the bluewing searobin (*P. punctatus*) which was taken from the FAO species identification sheets for fishery purposes, western central Atlantic, fishing area 31, Volume V. Geographic and depth distribution information for *Prionotus longispinosus, P. martis, P. ophryas, P. paralatus, P. roseus, P. rubio, P. scitulus, P. stearnsi, P. tribulus, and Bellator militaris* was taken from National Marine Fisheries Service collection data stored at the Pascagoula, Mississippi Laboratory. Distributional information for all other species was taken from published sources.

The *"NOTE"* section under each species illustration is not intended to be part of the diagnostic key, but rather to provide additional information on taxonomy, as well as depth and geographical distribution of the species. A glossary of terms is provided at the end of the text.

Methods

Measurements were taken in accordance with Lagler et. al. (1962). Morphological features are defined in Figures 1 through 4. Breast, chest, and throat areas are defined as follows: the breast comprises that area between the inner-most (posterior) and outer-most (anterior) pelvic fin rays; the chest comprises that area between the outer-most (anterior) pelvic fin ray and the outer-most (anterior) free pectoral ray; and the throat comprises that area forward of the chest extending to the branchiostegal membrane. The term "weakly," referring to scalation, indicates that only a few scales extend past the boundary between breast, chest, and throat areas (the location of the free pectoral rays are morphologically distorted to provide a better view of the boundaries between throat, chest and breast). The symphysis of the premaxillary (Fig. 2) was used when taking head or body length measurements. Owing to differences in growth rates between adults and juveniles (animals under 10 cm standard length), this key is restricted to adult animals.



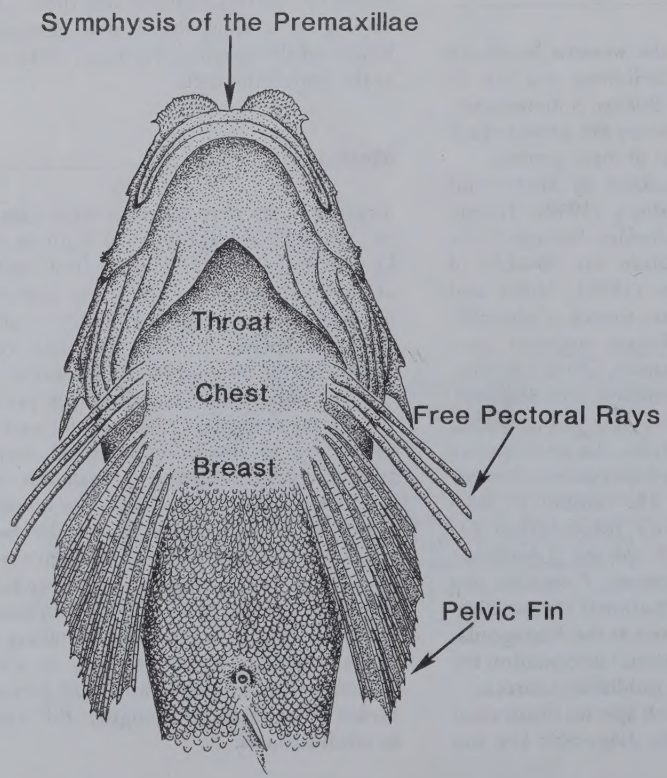


Figure 1 (above)
Figure 2 (below)
Morphological characteristics of *Prionotus* and *Bellator.*

Key to *Prionotus* and *Bellator*

I Dorsal spines 10 (rarely 9 or 11), posterior spines short and may be difficult to find; soft dorsal with 12 or 13 rays; first and second dorsal spines never long and filamentous; opercular membrane partially scaled above opercular spine (Figure 3) ..... ***Prionotus***

II Dorsal spines usually 11 (rarely 10 or 12); soft dorsal with 11 rays; first one or two dorsal spines often long and filamentous on males (with the exception of *B. brachychir*); opercular membrane unscaled; individuals relatively small (generally less than 17 cm SL) ..... ***Bellator***

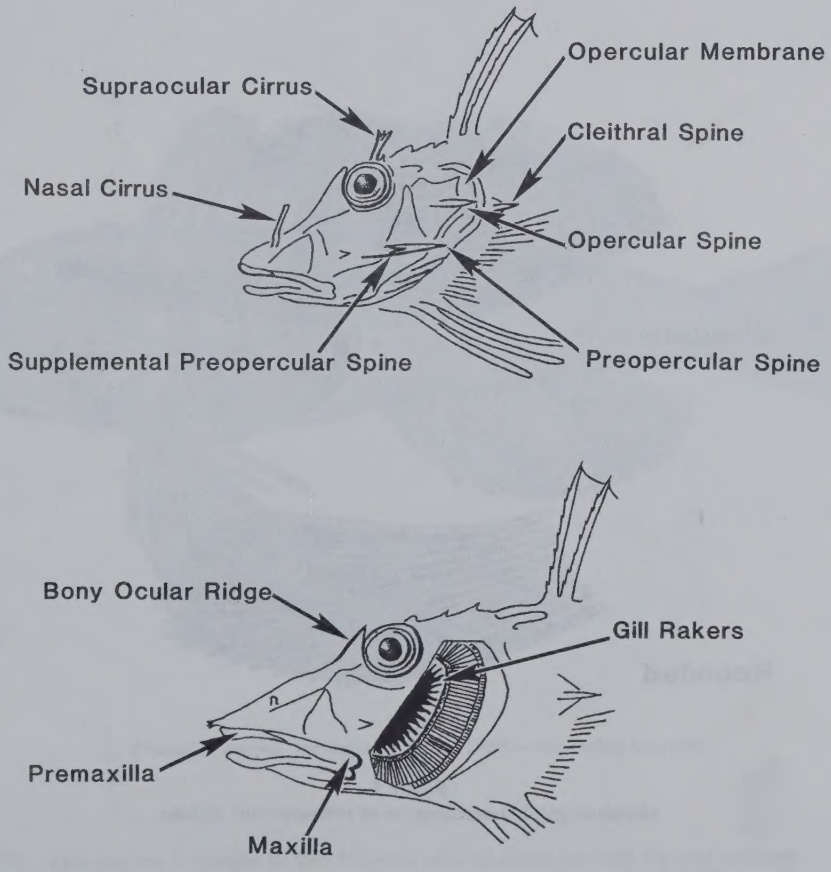


Figure 3
Morphological characteristics of *Prionotus* and *Bellator*.

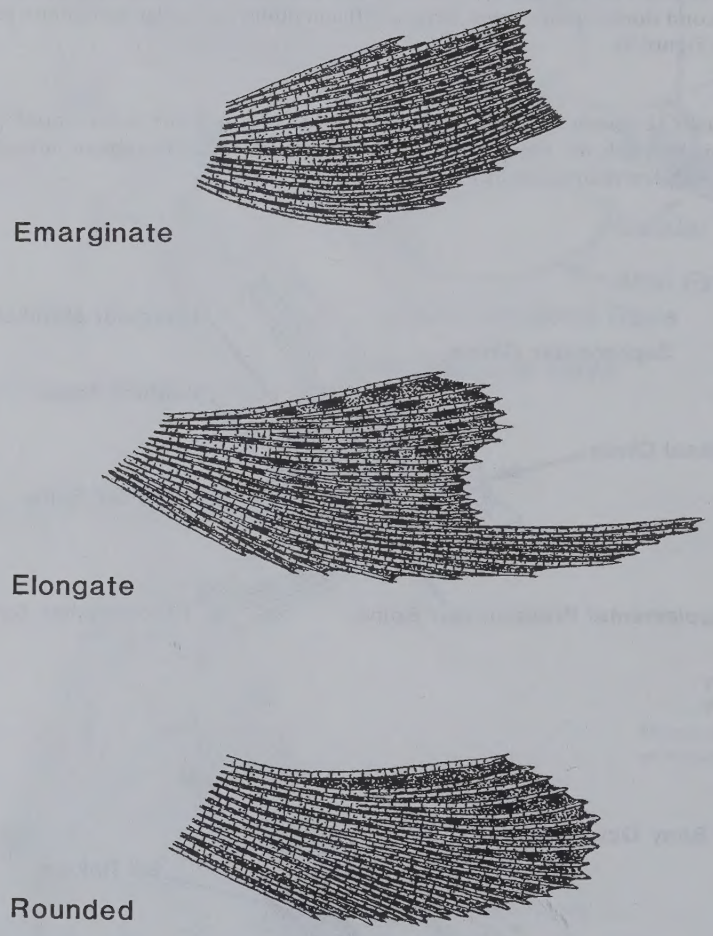


Figure 4
Morphological characteristics of *Prionotus* and *Bellator.*

Key to Species of *Prionotus* Lacèpède 1802

1a Pectoral fins very short (less than head length, and not extending beyond origin of anal fin), color black; body with distinct silvery coloration; lower jaw produced with a small ventral bony knob at symphysis of the lower jaw; preopercular spine short, reaching only to distal end of operculum or immediately anterior to it (Fig. 5). ..... ***P. stearnsi***

1b Pectoral fins moderate to long (equal to or greater than head length and extending beyond origin of anal fin), coloration variable; body coloration not silvery; lower jaw not extending beyond upper jaw; preopercular spine not short, reaching past operculum **2**

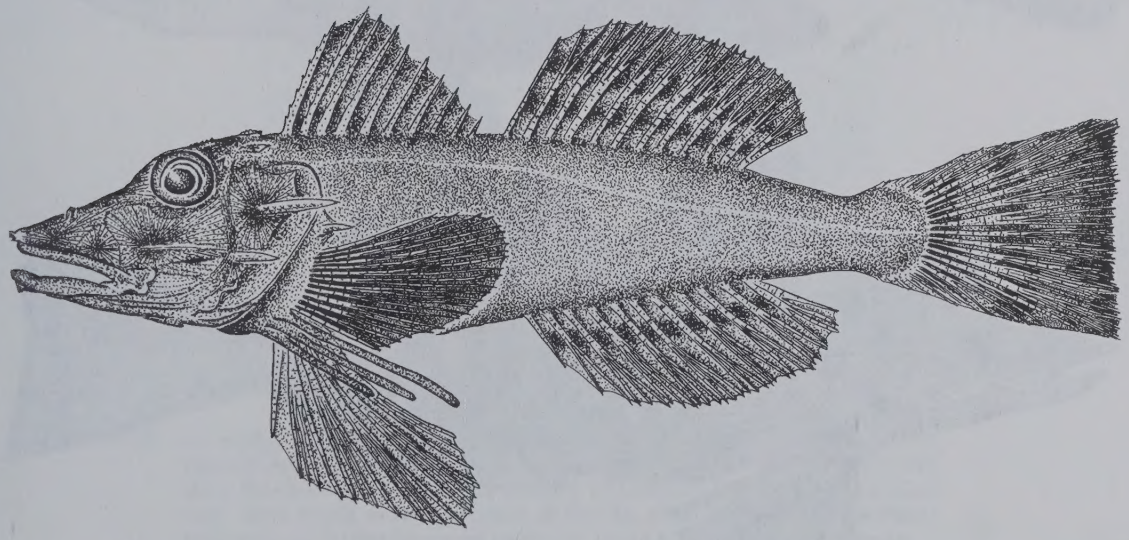


Figure 5
Prionotus stearnsi Jordan and Swain 1884—shortwing searobin.

NOTE: This species is unique to the *Prionotus* with its short pectoral fin and uniform silvery or dusky color; darker coloration on dorsal and anal fins may fade with preservation. Distribution: North Carolina to French Guiana; in depths between 6 and 300 fathoms, most commonly found between 20 and 60 fathoms.

2a Pectoral fins long (reaching to distal end of anal fin base or beyond; *P. evolans* pectoral fin length is highly variable, however, it can be readily identified by its distinct dark lateral line and dark band below the lateral line) **3**

2b Pectoral fins intermediate in length (reaching from between anal fin origin and center of anal fin base) .. **8**

3a Head large (head length greater than one third of standard length) **4**

3b Head small (head length less than one third of standard length) **5**

4a Lower, non-free pectoral fin rays elongated, reaching past posterior margin of anal fin; lateral line not darkened; no dark stripe below lateral line; chest, breast, and throat naked; (scales extend onto breast in 5% of specimens examined); nasal spines present, but may be small and difficult to discern (detection is best made by running finger downward toward snout on snout region) (Fig. 6) ..... ***P. alatus***

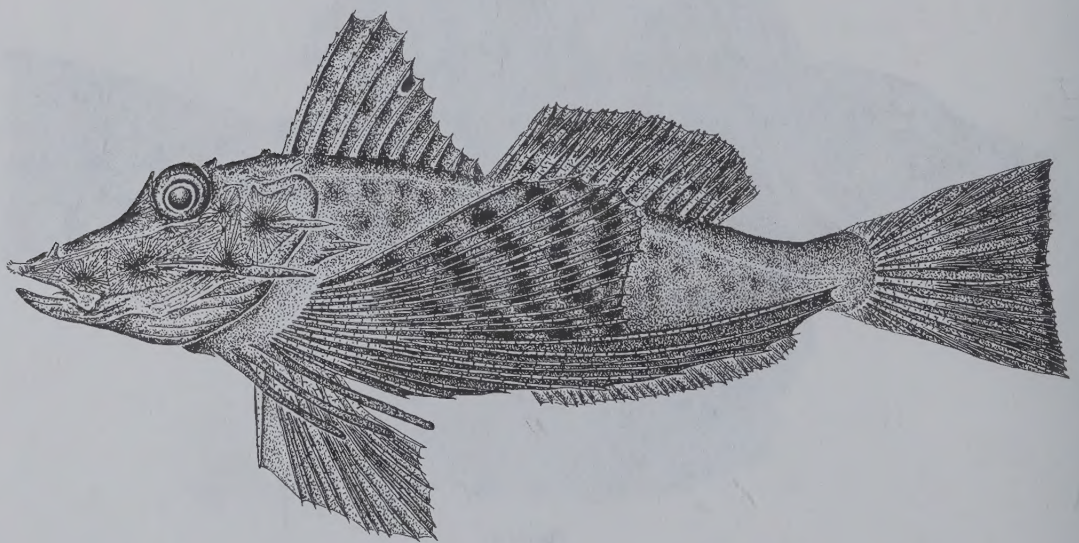


Figure 6
Prionotus alatus Goode and Bean 1883—spiny searobin.

NOTE: Body coloration yellowish to rust. Distribution: Virginia to Florida, including Greater Bahamas Bank, and west to the Mississippi River Delta, and Campeche Bank, in depths between 30 and 250 fathoms, most commonly found between 30 and 70 fathoms.

4b Pectoral fin rounded, with lower non-free rays not greatly longer than upper non-free rays; lateral line darkened; dark stripe below lateral line extending to caudal peduncle; chest, breast and throat scaled; nasal spines absent (Fig. 7) ..... ***P. evolans***

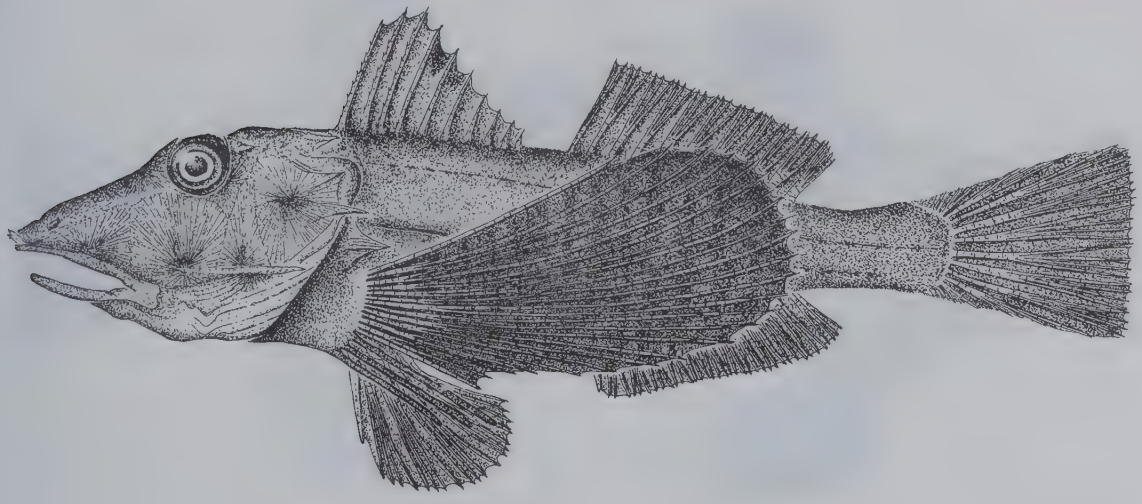


Figure 7
Prionotus evolans (Linnaeus 1766)—striped searobin.

NOTE: Pectoral fin brown, usually with very narrow transverse wavy brown lines close together, length varying from 8th anal fin ray to behind anal fin base; body with three brown crossbars extending ventrally and forward to lateral line. Distribution: Nova Scotia to the east coast of Florida, possibly Little Bahamas Bank; between 5 and 80 fathoms, most commonly found between 10 and 35 fathoms.

5a Nasal and supraocular cirri present **6**

5b Nasal and supraocular cirri absent **7**

6a Pectoral fin rounded, upper two rays not extending to caudal base as thread-like filaments; pectoral fin extending to end of anal fin base or beyond; first dorsal spine longer than second or third (Fig. 8) ..... ***P. ophryas***

Figure 8
Prionotus ophryas Jordan and Swain 1884—bandtail searobin.

NOTE: Caudal fin with distinct black banding (usually 3 bands); black banding also on free pectoral rays, pelvic fins, and underside of lips; dorsal and anal fins with brown blotches or spots; cirri dark; rusty-orange pigmentation scattered about head, pectoral and anal fins on live specimens; caudal peduncle with dark saddle; *P. grisescens* Teague, may be a junior synonym of *P. ophryas*. Distribution: U.S. east coast south of Cape Hatteras, throughout the Gulf of Mexico south to Campeche Bay and Venezuela; between 4 and 60 fathoms, most commonly found between 10 and 35 fathoms.

6b Two upper most rays of pectoral produced, extending to caudal base as thread-like filaments, remaining rays of medium length (55% of standard length); first dorsal spine slightly longer than second (Fig. 9) .... ***P. murieli***

Figure 9
Prionotus murieli Mowbray in Borodin 1928.

NOTE: Description, measurements, and distribution are from Teague: color in alcohol was bleached white above and below; median fins plain and translucent; caudal and free pectoral fin rays plain, with pectoral fins mottled. Distribution: known only from the holotype which was collected in 8 fathoms on Cay Sal Bank, Bahamas.

7a Pectoral fins with bright blue and/or dark ocellated spots throughout (spots on pectorals not ocellated on some variants), ventral edge dark or brown without blue margin, first 3–4 rays branded; caudal fin with dusky banding; pectoral fin rounded (Fig. 10) ..... ***P. roseus***

Figure 10
Prionotus roseus Jordan and Evermann 1886—bluespotted searobin.

NOTE: P. roseus is frequently confused with *P. rubio,* however, they may be easily separated by spreading the pectoral fins and noting the bright blue spots present on *P. roseus.* Branchiostegal membranes white or salmon-colored; dorsal fin spot not ocellated; anal fin generally unpigmented, but some specimens may have a black pepper-dot pigmentation pattern at the distal end. Distribution: North Carolina to Brazil, including Gulf of Mexico and Caribbean; between 5 and 100 fathoms, most commonly found between 15 and 50 fathoms.

7b Pectoral fins uniformly dark except for distinct blue margin on ventral edge; pectoral fin obliquely truncate (Fig. 11) ..... ***P. rubio***

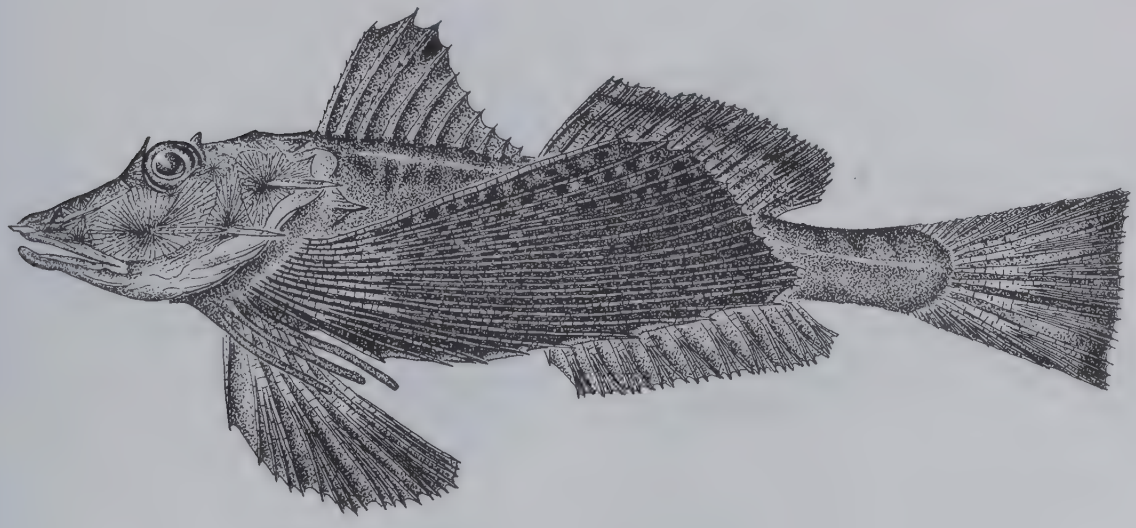


Figure 11
Prionotus rubio Jordan 1886—blackwing searobin.

NOTE: Three dorsal spots (which may appear as bars) are present along the base of the dorsal fin; two sets are along the spiny dorsal, and one along the soft dorsal; anal fin unpigmented; pelvic fins with black pepper-dot pigmentation; blue margin on ventral edge of pectoral fin, fades on preserved specimens. Distribution: North Carolina to Cuba, the Gulf of Mexico to Texas; from inshore bays to 116 fathoms, most commonly found between 5 and 30 fathoms.

8a Mouth large, maxillary terminating at or immediately in front of anterior- most portion of the bony ocular ridge (Fig. 12a) **9**

8b Mouth small, maxillary terminating well in advance of anterior-most portion of the bony ocular ridge (Fig. 12b) **11**

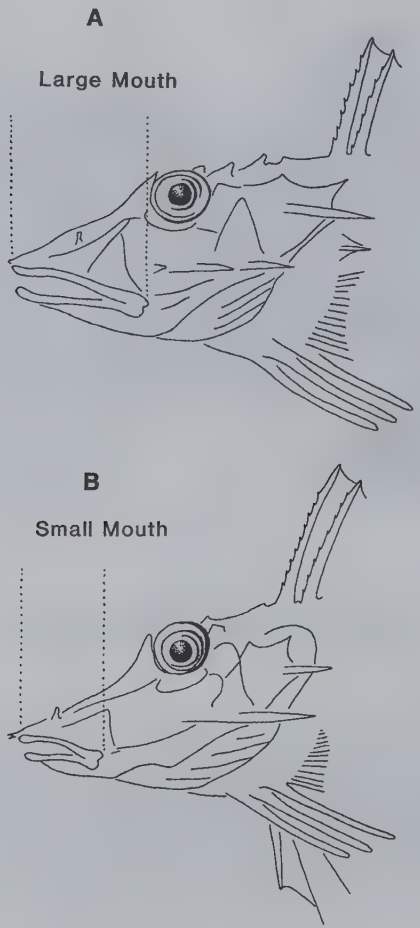


Figure 12

Relative mouth sizes are compared: (**A**) large, maxillary terminating at or immediately in front of anterior-most portion of the bony ocular ridge; (**B**) small, maxillary terminating well in advance of anterior-most portion of the bony ocular ridge.

9a Body and pectoral fins with varying numbers of brown spots (Fig. 13) ..... *P. punctatus*

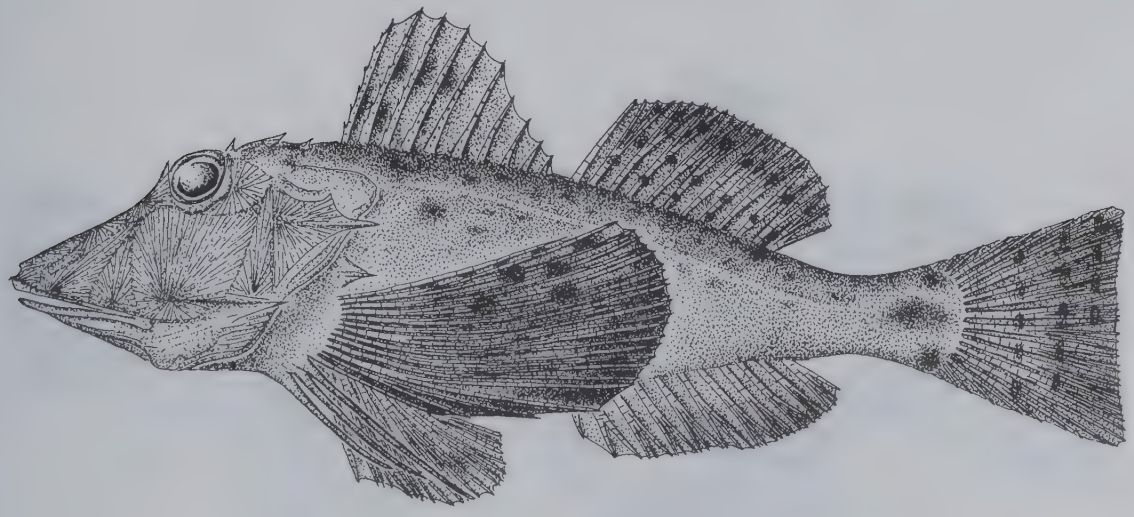


Figure 13
Prionotus punctatus (Bloch 1797)—bluewing searobin.

NOTE: Dorsal fin spot present in young, disappearing or diminishing with growth; often with a spot at center of base of caudal fin and at its upper and lower margins behind basal spot, forming corners of a triangle; pectoral fins of moderate length, reaching to between fifth and seventh rays of anal fin (variants may overlap with *P. longispinosus*), fin grayish brown to dark green with darker, diffuse oval spots; body with rounded brown spots or blotches. Distribution: Cuba to Campeche Bay south to Argentina (does not occur in northern Gulf of Mexico); between 4 and 93 fathoms, most commonly found at about 16 fathoms.

9b Body and pectoral fins without brown spots **10**

10a Pectoral fins with wide dark vertical bands with green coloration towards distal end of lower pectoral rays; free rays banded; head relatively large (three head lengths reach to posterior half of caudal fin) (Fig. 14) ..... ***P. tribulus***

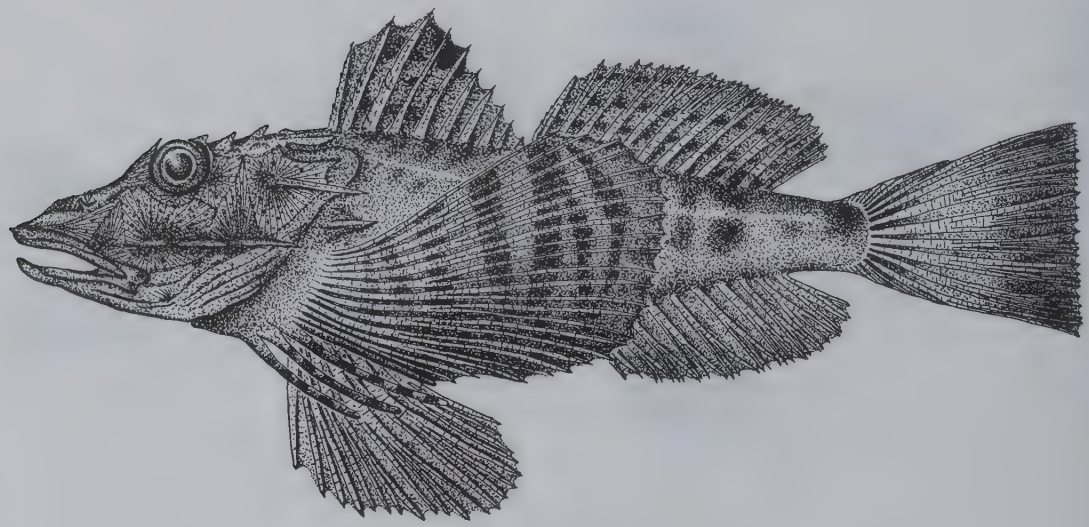


Figure 14
Prionotus tribulus Cuvier 1829—bighead searobin.

NOTE: *P. tribulus* is a robust species; its head is relatively large with more spines than other *Prionotus* species; spinous dorsal fin with a single spot; body with two dark "slashes"—one at midbody, and one just posterior—also a blotch located on caudal peduncle; gill rakers on lower limb (including angle) of first arch 11–16[1]; eye length range from 15 to 21% of head length, with an average of 17% in six specimens. Distribution: New York to Florida through the Gulf of Mexico to the Bay of Campeche; between inshore and 100 fathoms, most commonly found between 5 and 15 fathoms.

[1] A 24% overlap beween *P. tribulus* and *P. evolans* lower limb gill raker counts was reported by Ginsburg (1950). This occurred primarily in smaller specimens (41–129 mm SL).

10b Pectoral fins with transverse rows of small, light-colored, non-ocellated spots, a light blue ventral margin, and a diffuse black spot posterior to origin of pectoral fin; head relatively small (three lengths reach to anterior half of caudal fin); free pectoral rays not banded (Fig. 15) ..... ***P. longispinosus***

Figure 15
Prionotus longispinosus Teague 1951—bigeye searobin.

NOTE: Anal fin with a median dark band along its entire length with a lighter margin (colors faded in preserved specimens); spinous dorsal fin with a single spot; eye length range from 22 to 28% of head length, with an average of 25% in six specimens. Distribution: northern Gulf of Mexico (does not occur in Caribbean); between inshore bays and 120 fathoms, most commonly found between 5 and 50 fathoms.

11a Pectoral fins emarginate (Fig. 4) **12**

11b Pectoral fins round (Fig. 4) **13**

12a Preopercular spine short, 8% of standard length, reaching just past operculum, does not reach or extend to the distal end of the cleithral spine; pectoral fin with two broad dark areas separated and surrounded by lighter areas (Fig. 16) ..... ***P. beani***

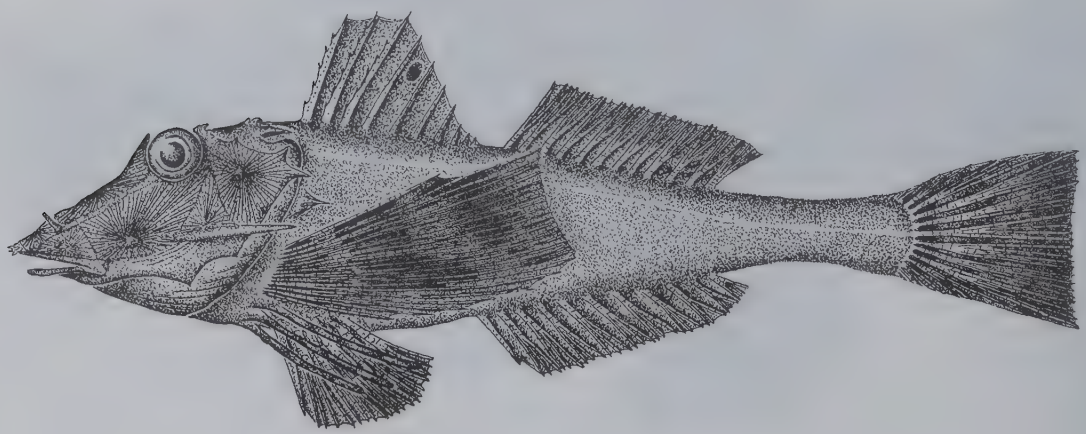


Figure 16
Prionotus beani Goode 1896.

NOTE: *Prionotus beani* and *P. paralatus* are very similar, and may best be separated geographically; *P. beani* and *P. paralatus* pre- opercular spine measurements overlap in 10% of specimens examined. Distribution: Honduras to Brazil; between 25 and 150 fathoms, most commonly found between 30 and 70 fathoms.

12b Preopercular spine long, 12% of standard length, extending well beyond the operculum, and does not reach or extend to distal end of the cleithral spine; pectoral fin with dark spots and some pink coloration scattered throughout (Fig. 17) ..... ***P. paralatus***

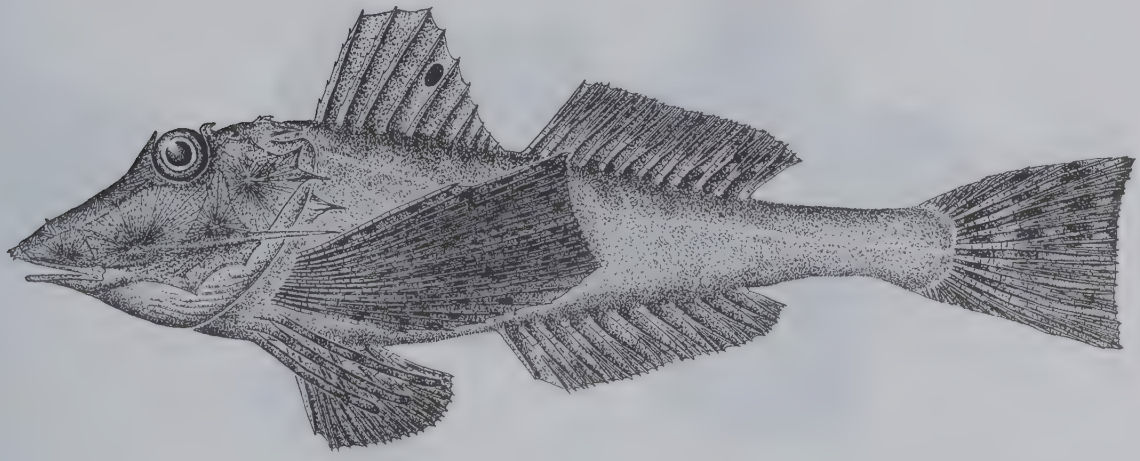


Figure 17
Prionotus paralatus Ginsburg 1950—Mexican searobin.

NOTE: *P. paralatus* may be distinguished from *P. alatus* in lacking nasal spines and elongated lower, non-free pectoral fin rays. *Prionotus paralatus* and *P. beani* are very similar, and may best be separated geographically; *P. beani* and *P. paralatus* preopercular spine measurements overlap in 10% of specimens examined. Distribution: Mississippi River delta to Campeche; between 5 and 150 fathoms, most commonly found between 20 and 80 fathoms. Intermediate hybrids may occur off Florida and Alabama.

13a Spinous dorsal fin with one non-ocellated spot; branchiostegal membranes black or dusky (color may fade in preserved specimens) (Fig. 18) ..... ***P. carolinus***

Figure 18
Prionotus carolinus (Linnaeus 1771)—northern searobin.

NOTE: Spinous dorsal fin with white horizontal band under dark spot; pectoral fin spotting between dorsal-most (2–6) rays; caudal fin with light bands dorsally, remainder of fin dark; anal fin with dark band and a white margin; body with brown blotches or spots dorsally; *P. carolinus* may be confused with *P. scitulus* and *P. martis*, but can be easily separated from them by the dark bars on its upper caudal fin as compared with distinct round spots on *P. martis* and *P. scitulus*. Distribution: Nova Scotia to eastern Florida; between 5 and 93 fathoms, most commonly found between 10 and 30 fathoms.

13b Spinous dorsal fin with two non-ocellated blotches, one between the first and second spines, the other between the fourth and fifth spines; branchiostegal membranes light, never dark or dusky **14**

14a Throat naked; joined pectoral rays 12 to 14, modally 13; gill rakers on lower limb including angle usually 11, varying 10–13 (Fig. 19) ..... ***P. scitulus***

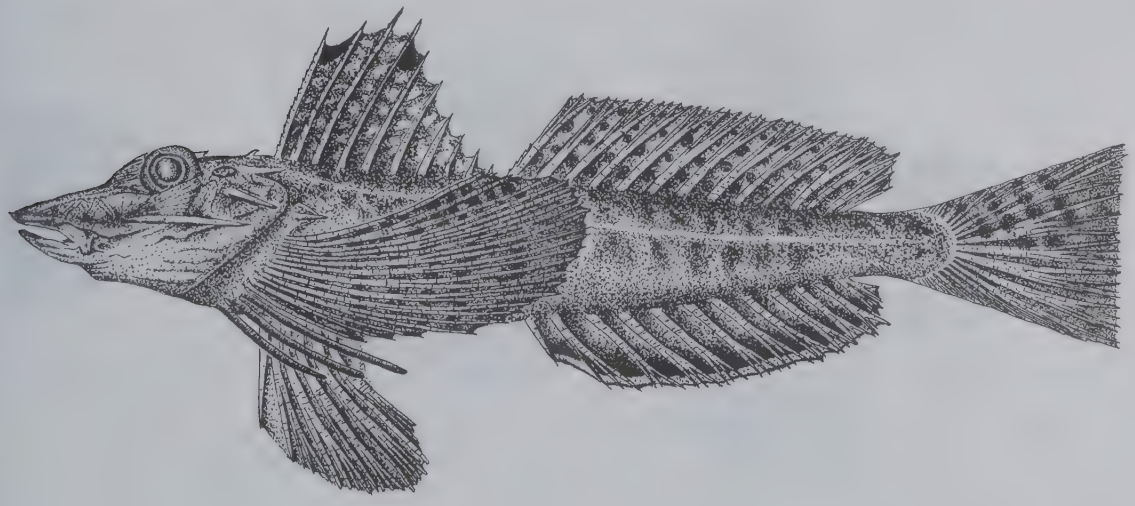


Figure 19
Prionotus scitulus Jordan and Gilbert 1882—leopard searobin.

NOTE: *P. scitulus, P. martis,* and *P. carolinus* are very similar and care must be taken to observe diagnostic characteristics to prevent misidentification of these species; geographic range separates *P. martis* and *P. carolinus,* however the distribution of *P. scitulus* overlaps the range of both *P. martis* and *P. carolinus.* Distribution: North Carolina to Venezuela through the Gulf of Mexico to the Bay of Campeche; between 3 and 50 fathoms, most commonly found between 5 and 25 fathoms.

14b Throat entirely scaled; joined pectoral rays 14 to 15, modally 14; gill rakers on lower limb including angle usually 9, varying 8–11 (Fig. 20) ..... ***P. martis***

Figure 20
Prionotus martis Ginsburg 1950—barred searobin.

NOTE: See additional comment on *P. scitulus* 14a. Distribution: west coast of Florida to offshore of Mobile Bay, Alabama (possibly west to Texas); between 6 and 25 fathoms, most commonly found between 10 and 20 fathoms.

Key to Adult Species of *Bellator* Jordan and Evermann 1896

1a Cleithral spine long, extending well beyond tip of opercular spine (Fig. 21); chest scaled; thin horn-like projections extending well beyond snout **2**

1b Cleithral spine short, not extending beyond tip of opercular spine (Fig. 21); chest naked; horn-like projections barely extend beyond snout, almost blunt **3**

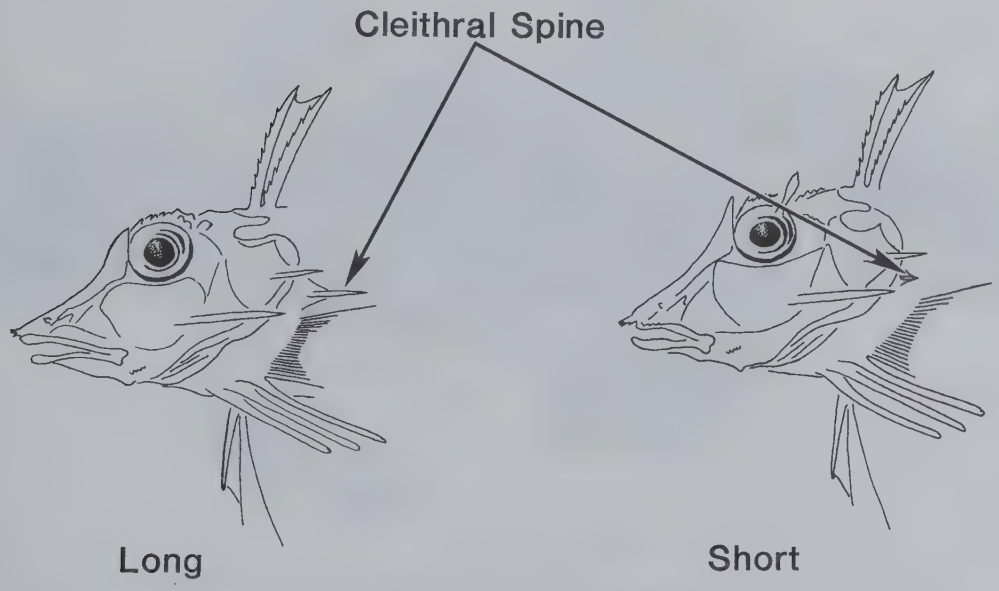


Figure 21
Comparison between long and short cleithral spine.

2a Supplemental spine on pre-opercular present; longest pectoral fin rays reaching distal end of anal fin base in specimens over 10 cm; dorsal-most pectoral fin rays prominently marked with black and white bands; without dark ventral marginal band on pectoral; coloration in life rosy with horizontal yellow lines extending to the caudal fin (Fig. 22) ..... ***B. militaris***

Figure 22
Bellator militaris (Goode and Bean 1896)—horned searobin.

NOTE: First two dorsal fin rays elongate in males; one dark spot is usually present at the base of the last soft dorsal ray. Distribution: North Carolina through the Gulf of Mexico, south to the Colombia; between 11 and 118 fathoms, most commonly found between 15 and 40 fathoms.

2b Supplemental spine on pre-opercular spine absent or rudimentary; longest pectoral fin rays not reaching beyond third anal fin ray; dorsal-most pectoral fin rays lack black and white banding; dark band on ventral edge of pectoral fin (Fig. 23) ..... ***B. ribeiroi***

Figure 23
Bellator ribeiroi Miller 1965—Caribbean searobin.

NOTE: Only the first dorsal fin ray elongate in males. Distribution: Honduras to Brazil; between 22 and 43 fathoms.

3a First free ray of pectoral fin shorter than pectoral length; eyeball with tabs or tentacles on dorso-posterior portion; nasal spines present; mouth small, maxillary not extending to anterior margin of eye; pectorals with alternating patches of light and dark pigment, appearing as brown patches on dorsal 1–2 pectoral rays (often seen as bands) (Fig. 24) ..... ***B. egretta***

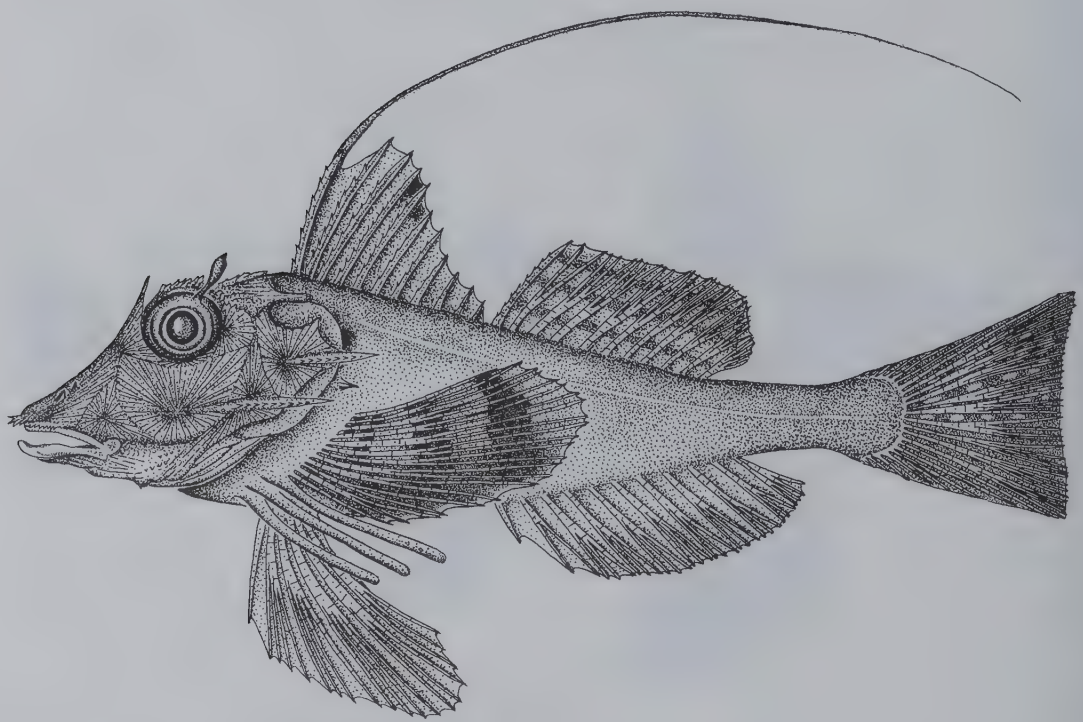


Figure 24
Bellator egretta (Goode and Bean 1896)—streamer searobin.

NOTE: Caudal fin with yellow spots dorsally and a reddish stripe ventrally; nasal cirra absent (present on *B. brachychir* but very difficult to see because of small size). Distribution: North Carolina to Florida Keys (possibly to Bahamas Bank) south to Barbados and Belize; between 22 and 125 fathoms, most commonly found between 35 and 100 fathoms.

3b First free ray of pectoral fin considerably longer than pectoral length; eyeball without tabs or tentacles; nasal spines absent; mouth large, maxillary extending beyond anterior margin of eye; pectorals dusky or with an elongate black spot dorsally, posterior margin white (Fig. 25) ..... ***B. brachychir***

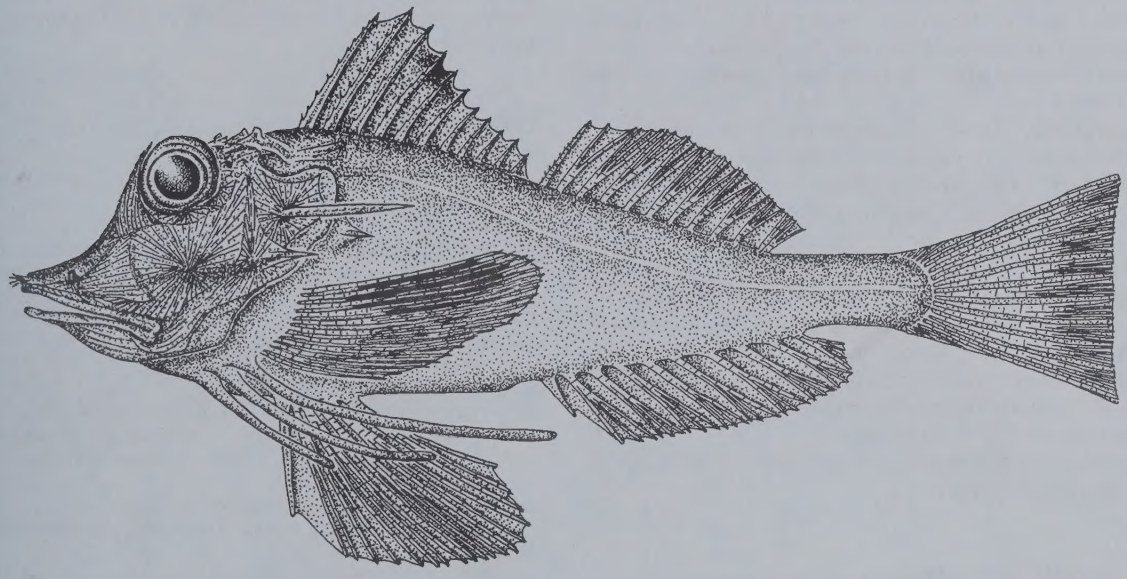


Figure 25
Bellator brachychir (Regan 1914)—shortfin searobin.

NOTE: Nasal cirra present but difficult to see. Distribution: North Carolina to west coast of Florida and south to Campeche Bank and Uruguay; between 15 and 200 fathoms, most commonly found between 75 and 150 fathoms.

Glossary

Blotch. A mark without a well-defined border. Edges of mark ragged and fading into background.

Branchiostegal Membrane. Membrane between branchiostegal rays on ventral side of gill opening, may extend posteriorly along edge of opercular as fleshly membrane (Fig. 1).

Candal Peduncle. The narrow part of the body immediately preceding the candal fin.

Cirri. Fleshy "tentacles." In some species of *Prionotus,* located at nostrils or just above eyes (Fig. 3).

Distal. Away from the origin or point of attachment.

Emarginate. Inner fin rays shorter than outer rays, giving the margin a notched appearance (Fig. 4).

Maxillary. The exposed bone forming the posterior part of the upper jaw; the maxillary does not bear teeth (Fig. 3).

Ocellated. Spot in which the central color is bordered by a ring of another color, generally white.

Premaxilla. The innermost bone of the upper jaw, bearing teeth.

Rudimentary. Imperfectly or incompletely developed.

Spot. A mark with a well-defined border.

Supraocular. Just above eyes.

Symphysis. The point at which the two halves of a jaw come together.

Acknowledgments

We wish to extend our sincere appreciation to George Burgess, Florida State Museum of Natural History, University of Florida for loan of museum specimens and for reviewing the manuscript; George C. Miller, NMFS retired, and Dr. William J. Richards, NMFS, Miami for technical advice and for reviewing the manuscript; Dr. Stephen T. Ross and Florida Department of Natural Resources for permission to use their line drawings as outlines for our figures. Drs. Stuart G. Poss, William D. Anderson, Jr., H. Dickson Hoese for reviewing the manuscript; Lee Likens, Carol L. Roden, and Miriam Hahn for their efforts in developing the text; Bennie Rohr for reviewing the manuscript; and Velda Harris who patiently typed many reorganizations of the text. We appreciate the help of those people aboard the NOAA Ship *Oregon II* for taking the time to collect specimens.

We also wish to dedicate this manuscript in memory of Elmer J. Gutherz (July 3, 1931 to June 10, 1991).

Citations

American Fisheries Society Committee (Robins, C. R., R. M. Bailey, C. E. Bond, J. R. Brooker, E. A. Lachner, R. N. Lea, and W. B. Scott).
1991. Common and scientific names of fishes from the United States and Canada. Fifth Ed. Am. Fish. Soc. Spec. Pub. 20, 183 p.

Ginsburg, I.
1950. Review of the Western Atlantic Triglidae (fishes). The Texas J. Sci. 2(4):489–527.

Jordan, D. S., and B. W. Evermann.
1896. A check-list of the fishes and fish-like vertebrates of North and Middle America. Rep. of the Comm. for 1895. U.S. Comm. of Fish and Fisheries 21(App. 5): 207–584.

Lagler, K. F., J. E. Bardach, and R.R. Miller.
1962. Ichthyology. J. Wiley and Sons, Inc., New York, 545 p.

Miller, G. C.
1965. A new species of searobin (Triglidae). Quart. J. Fla. Acad. of Sci. 28(3):259–266.

Miller, G. C., and W. J. Richards.
1991a. Nomenclatural changes in the genus *Prionotus* (Pisces: Triglidae). Bull. Mar. Sci. 48(3):757–762.
1991b. Revision of the Western Atlantic and Eastern Pacific genus *Bellator* (Pisces: Triglidae). Bull. Mar. Sci. 48(3): 635–656.

Teague, G. W.
1951. The sea-robins of America. A revision of the triglid fishes of the genus *Prionotus.* Comun. Zool. Mus. Hist. Nat. Montevideo 3(61):1–59.

Guide for Authors

NOAA Technical Report NMFS

PREPARATION

Title of manuscript should be as brief as possible (between 6 and 12 words) and should not include the Latin binomial except when it is needed for clarification, i.e. to distinquish between species sharing the same common name or between species known internationally by different common names.

Abstract should be one paragraph of about 200 words or less. It should state the main scope of the paper but emphasize its conclusions and relevant findings. Because abstracts are circulated by abstracting agencies, it is important that they represent the research clearly and concisely.

Text must be typed double-spaced throughout and should be divided into the following sections: **Introduction, Materials and Methods, Results, Discussion** (or **Conclusions**), and **Acknowledgments.** Headings within each section must be short, reflect a logical sequence, and follow the rules of multiple subdivision (i.e., there can be no subdivision without at least two items of subdivision). The entire text should be intelligible to interdisciplinary readers; therefore, all acronyms, abbreviations, and technical terms should be defined the first time they are used. The scientific names of species must be written in full the first time they are mentioned and abbreviated in subsequent references. Footnotes should be avoided as much as possible. We follow the *U.S. Government Printing Office, Style Manual* (1984 ed.) and the *CBE Style Manual* (5th ed.) for general format and style; the American Fisheries Society's most recent edition of *Common and Scientific Names of Fishes from the United States and Canada* for fish nomenclature. Dates should be written as 11 November 1991. Measurements should be expressed in metric units, e.g., tons as metric tons (t), but if the work is in British long tonnes, please make this fact explicit to the reader. The numeral one (1) should be typed as a one, not a lower-case el (l).

Citations comprise both unpublished and published works. Authors are advised to avoid references to nonstandard material such as internal and project reports wherever possible. For these works, include whether they are available from NTIS (National Technical Information Service) or from some other public depository. Personal communications and unpublished data must be cited in parentheses in the text with full address of communicator or author. Follow the name-and-year system for citation format. In the text, cite Smith and Jones (1977) or (Smith and Jones 1977). If there is a sequence of citations, list chronologically: Smith 1932; Green 1947; Smith and Jones 1985. Abbreviations of serials should conform to abbreviations given in *Serial Sources for Biosis Data Base*™. AUTHORS ARE RESPONSIBLE FOR THE ACCURACY AND COMPLETENESS OF ALL CITATIONS.

Tables should not be excessive in size and must be cited in numerical order in the text. All unusual symbols must be explained in the table heading. Other incidental comments can be footnoted with italic lower case letters (*a, b, c*) for general comment, with asterisks for probability in statistical data. Because tables are typeset, they need only be submitted typed and formatted.

Figures include line illustrations and photographs. Unless photographs are submitted on glossy paper with good contrast, we cannot guarantee a good final printed copy. Figures must be labeled with author's name and number of figure. Lettering within the figure should not be so heavy and large as to upstage the impact of the entire figure. Avoid "outlier" words in a figure which take up needless space. Each figure must include a legend that explains all symbols and abbreviations. These figure legends should be typewritten on a separate piece of paper at the end of the manuscript.

Copies of Published Reports are available free of charge to the senior author (50 copies) and to his or her laboratory (50). If the article is part of a proceedings or collection of articles, the senior author receives 50 free copies of the individual article and one copy of the collective work. Additional copies (reprints or offprints) of an article may be purchased in lots of 100 at a cost of $1.40 per page at the time of first printing. Additional copies of a collective work must be sought from the editor assigned to coordinate the research papers for submission as a NOAA Technical Report.

SUBMISSION

Send manuscript (original and two copies) to the Scientific Editor:

Dr. Linda Jones, Scientific Editor
National Marine Mammal Laboratory, F/AKC3
National Marine Fisheries Service, NOAA
7600 Sand Point Way NE
Seattle, WA 98115-0070.

Once the manuscript has been accepted for publication, you will be asked to submit a software copy of your manuscript to the Scientifc Editor. The software copy should be submitted in ASCII format (i.e., in a MS-DOS "print" or "nondocument" file) and should be placed on a 5.25-inch (preferably) or 3.5-inch disk that is double-sided, double or high density, and that is compatible with either IBM or Apple Macintosh systems.

Once the manuscript is being typeset and prepared for publication, all inquiries should be made to the Managing Editor:

Sharyn Matriotti, Managing Editor
NOAA Technical Reports NMFS
National Marine Fisheries Service
Scientific Publications Office, F/NWR1
7600 Sand Point Way NE
Seattle, WA 98115-0070.

UNITED STATES
DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC
ADMINISTRATION
NATIONAL MARINE FISHERIES SERVICE
SCIENTIFIC PUBLICATIONS OFFICE
BIN C15700
SEATTLE, WA 98115
OFFICIAL BUSINESS

Penalty for Private Use, $300

BULK RATE
POSTAGE & FEES PAID
U.S. Department of Commerce
Permit No. G-19

NOAA SCIENTIFIC AND TECHNICAL PUBLICATIONS

The National Oceanic and Atmospheric Administration was established as part of the Department of Commerce on October 13, 1970. The mission responsibilities of NOAA are to assess the socioeconomic impact of natural and technological changes in the environment and to monitor and predict the state of the solid Earth, the oceans and their living resources, the atmosphere, and the space environment of the Earth.

The major components of NOAA regularly produce various types of scientific and technical information in the following kinds of publications:

PROFESSIONAL PAPERS—Important definitive research results, major techniques, and special investigations.

CONTRACT AND GRANT REPORTS—Reports prepared by contractors or grantees under NOAA sponsorship.

ATLAS—Presentation of analyzed data generally in the form of maps showing distribution of rainfall, chemical and physical conditions of oceans and atmosphere, distribution of fishes and marine mammals, ionospheric conditions, etc.

TECHNICAL SERVICE PUBLICATIONS—Reports containing data, observations, instructions, etc. A partial listing includes data serials; predictions and outlook periodicals; technical manuals, training papers, planning reports, and information serials; and miscellaneous technical publications.

TECHNICAL REPORTS—Journal quality with extensive details, mathematical developments, or data listings.

TECHNICAL MEMORANDUMS—Reports of preliminary, partial, or negative research or technology results, interim instructions, and the like.

Information on availability of NOAA publications can be obtained from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161